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ABSTRACT

A physical fitness test battery for educable and trainable mentally handicapped children is presented. Instructions are given for administering the test; descriptions are given of the seven test items, including the 25 yard run, bent arm hang, leg lift, static balance, thrust, and 300 yard run-walk. Rationale for the items and factors in determining the tests are reviewed; a score card is appended. (JD)

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PHYSICAL FITNESS TEST BATTERY FOR MENTALLY RETARDED CHILDREN (Trainable and Educable)

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OFFICE OF EDUCATION

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Hollis F. Fait

INTRODUCTION

To plan a physical education program that will make maximum contributions to the improved physical fitness of the youngsters in the program, the level of their physical fitness and the specific aspects or factors of fitness in which they are deficient must first be determined. Then, after participation for a certain length of time in the program of physical education activities planned to meet the needs which were evidenced, an evaluation is necessary to determine the success of the program as shown by the amount of improvement in physical fitness. For normal youngsters the measurements necessary for planning a good physical education experience and evaluating its effectiveness can be made with a battery of test items, each of which measures some factor of physical fitness such as strength, speed, agility.

Until the development of the physical fitness battery of tests described in this booklet, no special tools for measuring the physical fitness of the mentally retarded existed. The test items used for evaluating normal children were given also to the mentally retarded. However, as the result of several research studies, evidence began to accumulate that indicated that these test items are highly related to I.Q. level when the level is below normal intelligence. The ability to memorize and think reflectively was shown to have a direct bearing on the score achieved in the performance of a given test item. Additional evidence that this was true was supplied by a study by Fait and Kupferer who found that, when physical fitness test items were simplified for the mentally retarded, the relationship of score to I.Q. was greatly diminished. In the physical fitness test items which involve a complex pattern of movements, the intelligence factor influences the score as much or more than

the physical fitness factor that the test is purported to measure, and so an accurate profile of the physical fitness of the mental retardate is not secured.

The need for test items that would be simple to perform and easy to administer to mental retardates had been shown. It was to fill this need that research in physical fitness testing of the mentally retarded was undertaken by Dr. Hollis Fait, financed by a grant from the Joseph P. Kennedy, Jr., Foundation. The battery of test items presented in this booklet are the result of his work. This battery of tests was found to measure more accurately the true level of physical fitness of the mentally retarded than is possible with tests designed for normal youngsters.

Criteria

The test items developed for inclusion in the physical fitness battery for the mentally retarded were adapted from test items that have been shown to measure some aspects of physical fitness in normal youngsters. All of the test items selected meet the following criteria:

1. The tests evaluate those physical characteristics that contribute greatly to efficient and successful motor movement and that are not highly related to mental ability as measured by I.Q. (Preference was given to those test items that are similar to tests commonly used for normal youngsters.)

2. The tests are easy to administer and simple to score and are objective and reliable.

3. Each test produces a wide range of scores and provides a score for each subject, thus eliminating a score of zero or failure as often as possible.

4. Each test measures a different factor of physical fitness.

Test Items

The test items of the battery are:

1. Twenty-five Yard Run
2. Bent Arm Hang
3. Leg Lift
4. Static Balance
5. Thrust
6. 300 Yard Run-Walk

Testing the Educable and Trainable

The research in the use of these test items indicates they are appropriate for both educable and trainable mentally retarded youngsters, if the subjects are free from any physical defects that would have a direct bearing on their scores. However, there would generally be no reason that a child with a disability in one area of the body could not be tested on items that do not involve that area.

ADMINISTERING THE TESTS

If the items are all to be given in one day, they should be placed in an order that will not require the subject to perform tests that may fatigue him in certain portions of the body to the detriment of his score on the following item. For example, running the 300 Yard Run-Walk test item is likely to create enough fatigue to affect the score of the 25 Yard Dash if it is run immediately after the former even though one is basically involved with the factor of speed and the other with endurance. The following order is recommended to eliminate fatigue as a factor: 25 Yard Dash, Bent Arm Hang, Leg Lift, Static Balance Test, Thrust, and 300 Yard Run-Walk.

Facilities and Equipment

The test items may be given indoors or outside with equal ease with the exception of the 300 Yard Run-Walk. The space required for this item is such that it can be performed inside only if the participants run in laps, and keeping track of the number of laps which have been run may create confusion. The administration of the 25 Yard Dash requires a 35 yard straight runway and something against which the foot can be placed for a brace to start the race. A cleared wall may be used for this purpose inside the building. When testing out-of-doors, a board two inches high by four inches wide and two or three feet long may be secured to the ground for a starting block. The leg raise will require a mat at least 6' by 4' in size. If a mat is not available, a mattress with a clean cover or several layers of blankets may be substituted. For the Bent Arm Hang a bar is needed. If a stationary bar is not available, a door bar may be used. Other items of equipment necessary for the testing are stop watches and scoring cards.

Testing Stations

For maximum efficiency in giving the test items, five testing stations should be set up with a tester at each station. If the testing stations are placed in an ordered sequence, most mentally retarded subjects will be able to move from station to station without difficulty. It is helpful to have an assistant to keep the subjects moving in the right direction to the next station.

Recording Scores

For ease in recording the scores, a 4" x 6" card with his name on it may be carried by each student from station to station. Students

incapable of carrying the card without losing or mutilating it may have their cards pinned to their shirts. The tester at each station records the score on the student's card as soon as he completes the test.

Personnel

Only one person is required to administer the 25 Yard Dash if he serves as both timer and starter. He will need to stand at the finish line and give the command to start from there. One person is able to administer the Bent Arm Hang, Static Balance Test, and Thrust. An assistant will be needed for the Leg Lift. The 300 Yard Run-Walk should be the last item given. Three people will be required to administer the test: a scorer, a timer, and an assistant to keep the students in line after they have finished.

Uniformity in Testing

In administering the test items, extreme care must be taken to ensure that each item is performed uniformly by all the subjects. Unless this is done, the comparison with norms will not be meaningful nor will the comparison of students' scores with each other have any valid meaning. If a subject is unable to perform in the prescribed manner, his score need not be discarded entirely as a measurement of the fitness factor being tested, however. The score may still be used as a basis for comparison of his future scores on that item to determine the extent of improvement achieved by the subject.

DESCRIPTION OF TEST ITEMS

Twenty-five Yard Run (Measures the speed of running short distances)

The subject places either foot against the wall or block with the

foot parallel to it. He then takes a semi-crouch position with the hands resting lightly on the knees. His forward foot and trunk are turned in the direction he is to run. His head is held up so that he is looking toward the finish line. At the command of "Ready. Go," the subject begins the run. The watch is started on the "Go" and is stopped as the subject passes the finish line. However, the subject is directed to run to a second line which is about five feet beyond the finish line to prevent his slowing down as he approaches the true finish line. The time of the run is recorded to the nearest one-tenth of a second.

Bent Arm Hang (Measures static muscular endurance of the arm and shoulder girdle)

A horizontal bar or doorway bar may be used for this test. A stool approximately 12 inches high is placed under the bar. The subject steps onto the stool and takes hold of the bar with both hands, using a reverse grip (palms toward the face). The hands are shoulders' width apart. The subject brings his head to the bar, presses the bridge of the nose to the bar, and steps off the stool. He holds this position as long as possible. The timer starts the watch as the subject's nose presses to bar and the body weight is taken on the arms. The watch is stopped when the subject drops away from the bar. The tester should be ready to catch the subject in the event that he falls. The number of seconds the subject held the position is recorded on the score card.

Leg Lift (Measures dynamic muscular endurance of the flexor muscles of the leg and of the abdominal muscles)

The subject lies flat on his back with his hands clasped behind the neck. A helper should hold the subject's elbows to the mat. The subject raises his legs, keeping the knees straight until they are at a

90 degree angle. Another helper, who stands to the side of the subject, extends one hand over the subject's abdomen at the height of the ankles when the legs are fully lifted. This serves as a guide to the subject in achieving the desired angle and encourages him to keep the legs straight. He should be instructed to touch the shins against the helper's arm. The subject is to do as many leg lifts as possible in the 20 second time limit. He begins on the command of "Go" and ceases on the command of "Stop." The score is the number of leg lifts performed during the 20 seconds.

Static Balance Test (Measures ability to maintain balance in a stationary position)

The subject places his hands on his hips, lifts one leg, and places the foot on the inside of the knee of the other leg. He then closes his eyes and maintains his balance in this position as long as he can. The watch is started the moment he closes his eyes. As soon as the subject loses his balance, the watch is stopped. The score is number of seconds to the nearest one-tenth of a second.

Thrusts (Measures the specific type of agility that is measured by the Squat Thrust or Burpee)

The subject takes a squatting position with the feet and hands flat on the floor. The knees should make contact with the arms. At the command "Go," the stop watch is started. The subject takes the weight upon his hands so that he may thrust his legs straight out behind him. The legs are returned to the original position. The score is the number of complete thrusts the subject is able to perform in 20 seconds. One half point is awarded for completing half of the thrust.

300 Yard Run-Walk (Measures cardio-respiratory endurance)

If the run is to be given outside on a track, it can be administered to large numbers at one time by placing the runners in one long straight row or in two rows with one behind the other. The runners in taking a starting position should place one foot comfortably ahead of the other. A semi-crouch position with the hands resting lightly on the knees is taken. At the command to go, the stop watch is started. The subject runs the prescribed course. He is allowed to walk part of the distance if he is unable to run the total distance. As each runner crosses the finish line, the timer calls off the time to a recorder who makes a check beside the corresponding time on a prepared sheet. As the timer continues to call off the times as the runners pass the finish line, the recorder goes down the line of times and checks the times called. If two runners cross the line at the same time, two checks are placed beside the appropriate time on the sheet. As the runners finish, they line up according to the order in which they finished. One person will need to help the runners stay in correct order. When the runners are all in line, the name of the runner and the time it took him to complete the race can be matched and placed on his score card by comparing the order of runners to the order of times as they appear on the sheet.

SUMMARY OF RATIONALE FOR SELECTING TEST ITEMS

A total of 40 tests was examined initially for possible use in the physical fitness test battery for the mentally retarded. All of these tests were items that are widely accepted as tests that measure some factor of physical fitness contributing to success in motor movement.

Modifications of some test items were made to reduce the complexity of movements required to perform them, thereby reducing also the need for memorizing a difficult movement pattern and retaining detailed directions. The test items were administered in both their original form and their modified form to the mentally retarded youngsters participating in the study. Any tests which produced a large number of failures were eliminated.

Determining Validity and Reliability

The relationship between the scores achieved on the remaining test items in both forms and the I.Q. of the subject was determined using Pearson's Product Moment of Correlation. Those test items which had a high correlation were eliminated. Some original tests, which because of their simplicity had a low correlation, were retained for possible inclusion in the battery. The modified test items which had not been eliminated were administered along with the original test items from which they were derived to children with normal intelligence. When a high correlation was found between scores on both forms of a test item, the modified item was accepted as measuring the same physical fitness factor as the original and was retained as part of the battery. In a test re-test with the mentally retarded subjects, it was shown that all the remaining tests had a high reliability.

Elimination of Duplicating Tests

In the next step, a correlation was run to determine possible duplication of tests in measuring the same item. A final selection was made in those cases in which there were duplications. An item which was like or very similar to an item used in the physical fitness battery for normal children was given preference in this final selection.

DETERMINING THE TESTS FOR MEASURING PHYSICAL FITNESS FACTORS IN THE MENTALLY RETARDED

Measuring Speed

To determine the distance that would provide the best measurement of the factor of speed in running, the subjects ran a distance of 150 yards. Their times were taken at intervals of 10 yards, 25 yards, 35 yards, 50 yards, 75 yards, 100 yards, 125 yards, and 150 yards. The relationship between time and I.Q. was found to be lowest at the 10 yard and 25 yard intervals. The relationship increased at each successive interval. In the test re-test the time at the 10 yard interval had less reliability than at the 25 yard interval; therefore, the latter was chosen as the test item for measuring speed in running.

A very high relationship was shown between the 25 Yard Dash and the Vertical Jump. Both items had a low relationship to I.Q. However, the 25 Yard Dash is more frequently used in the physical fitness testing of normal youngsters and so the Jump was rejected in favor of the Dash.

Measuring Muscular Endurance

The Bent Arm Hang was chosen for inclusion in the battery rather than such other commonly used measurements of static muscular endurance of the arms as the Pull-ups, Push-ups, or Dips because the scores achieved in performing the Bent Arm Hang had a very low correlation with I.Q. while the others had a relatively high correlation.

The bridge of the nose was chosen as the anchoring point rather than under the chin or at the forehead because the latter increased the number of failures, especially among girls, thereby decreasing the discriminatory power of the test. When the bar was anchored under the chin,

there was a tendency for some subjects to support the chin on the bar to help hold the body in position. Anchoring under the chin against the chest produced a test with less reliability than anchoring at the bridge of the nose.

Another static muscular endurance test for which the scores were found to have a low relationship to I.Q. was the Straight Arm Hang. The correlation between the score on this test and on the Bent Arm Hang was negligible. However, because less arm and shoulder girdle muscles are involved in the test than in the Bent Arm Hang, making it less important as a contributing factor in physical fitness, it was not selected for the battery.

The Leg Lift was adapted from Fleishman's Leg Lift Test which is given to normal youngsters. When the original Leg Lift Test was given to mentally retarded children, the scores were highly related to their I.Q. level. However, when the tester's arm was placed above the subject as a target for him to hit with his shins as described on page 7, the relationship between performance score and I.Q. was greatly reduced.

Scores on the Modified Sit-ups were also found not to be related to I.Q. to any significant extent, but the relationship is slightly higher than in the Leg Raise. The Modified Sit-ups were performed like the Sit-up of the American Association for Health, Physical Education and Recreation Youth Fitness Test Battery except that the subject was not required to touch the elbows alternately to the opposite knees.

It was found that the ideal length of time to be allotted for the performance of the Leg Lifts and Sit-ups was 20 seconds. With a longer period of time, a higher relationship between score and I.Q. resulted; less than 20 seconds produced a test with less reliability.

Measuring Balance

It is recognized that the Static Balance Test measures a specific type of balance, the ability to maintain equilibrium with the eyes closed; however, a significant relationship does exist between this type of balance and balance maintained with the eyes open as when walking on a balance beam and balance of the body in dynamic movement as when hopping on one foot. The Static Balance Test was chosen over other types of balance tests because the correlation between ability to score on the test and I.Q. neared zero while correlations of the others were higher.

A modified dynamic balance test which was examined did show a low relationship between I.Q. and score on the test. This consisted of hopping along a straight line two inches wide and six feet long. The subject stands on one foot with the other lifted behind him. He hops forward on one foot along the line, keeping the center of his foot on the line. Each hop should be from 12" to 16" long. His score is the number of times his toes land off the tape. The test should be administered three times and the lowest score recorded. This test like the Static Balance Test has little or no relationship between score and I.Q.

Measuring Agility

Commonly used tests for measuring agility consist of movements requiring a rapid change of direction; tests that were analyzed for inclusion in this battery were the Zig Zag Run, AAHPER Shuttle Run, Cureton's Agility Run, and the Burpee or Squat Thrust. It was found that the ability to perform all of these tests was highly related to I.Q.

In a modified agility run consisting of weaving back and forth between three chairs set equi-distance apart in a straight line with the path marked on the floor, the relationship between I.Q. and the score

was diminished but was still relatively high. Subsequent testing of normal youngsters indicated that there was a fairly high relationship between the ability to score on this and other agility runs, verifying that the test does measure a factor of agility which is also measured by the other tests.

The Thrust, the agility test chosen for this battery, was an adaptation of the Burpee or Squat Thrust. Scores on the Thrust had a very low relationship to I.Q. When the test was administered to normal youngsters, a very high relationship was found between scores from this test and scores from the test from which it was adapted, indicating that the same factor of agility was being measured.

The ability to perform the Squat, a test also adapted from the Squat Thrust--being the first half of the Squat Thrust test, was not greatly related to I.Q. score. The relationship was slightly higher than in the Thrust and, therefore, the Thrust was chosen as the test item for this battery.

Score Card for Physical Fitness Tests

25 Yard Run

Boys
(Score in seconds)

Age	Trainable Low	Av.	Good	Educable Low	Av.	Good
9-12	7	6	5.2	6.2	5.2	4.4
13-16	6.5	5.5	4.7	5.4	4.7	4.2
17-20	6	5	4.2	5.1	4.4	3.9
			Girls			
9-12	7.4	6.3	5.3	5.8	5.4	5.2
13-16	6.7	5.6	4.7	6.1	5.2	4.3
17-20	7.3	6.1	5.1	6.4	5.4	4.7

Bent Arm Hang

Boys
(Score in seconds)

Age	Trainable Low	Av.	Good	Educable Low	Av.	Good
9-12	2	10	16	3	19	33
13-16	11.2	22	30.2	5	25	43
17-20	23	23	31	8	30	50
			Girls			
9-12	2	8	12	3	9	13
13-16	4	14	22	5	15	23
17-20	3	9	13	4	12	18

Leg Lift

Boys

Age	Trainable Low	Av.	Good	Educable Low	Av.	Good
9-12	6	9	12	7	10	13
13-16	6	9	12	8	11	14
17-20	7	10	13	8	11	14
			Girls			
9-12	6	10	14	6	10	14
13-16	7	11	15	7	11	15
17-20	6	10	14	6	10	14

Static Balance

Boys
(Score in seconds)

Age	Trainable Low	Av.	Good	Educable Low	Av.	Good
9-12	3	4.4	5.8	4	5	6
13-16	3.1	4.5	5.9	5	6	7
17-20	3.2	4.6	6	5	10	15
			Girls			
9-12	2.2	3.2	4.2	2.5	3.5	4.5
13-16	5.1	6.1	7.1	8.6	9.6	10.6
17-20	4.9	5.9	6.9	5.2	6.2	7.2

Thrust

Boys

Age	Trainable Low	Av.	Good	Educable Low	Av.	Good
9-12	4	8	10	6	12	14
13-16	4	8	10	8	14	16
17-20	5	9	11	8	14	16

Girls

9-12	4	8	10	5	9	11
13-16	4	8	10	8	12	14
17-20	5	9	11	5	9	11

300 Yard Run-Walk

Boys
(Score in seconds)

Age	Trainable Low	Av.	Good	Educable Low	Av.	Good
9-12	145	115	95	105	80	60
13-16	111	86	66	95	75	55
17-20	104	79	59	74	59	39

Girls
(Score in seconds)

9-12	198	148	108	143	113	83
13-16	158	108	65	125	91	61
17-20	159	107	66	142	102	71